

(19) World Intellectual Property Organization  
International Bureau



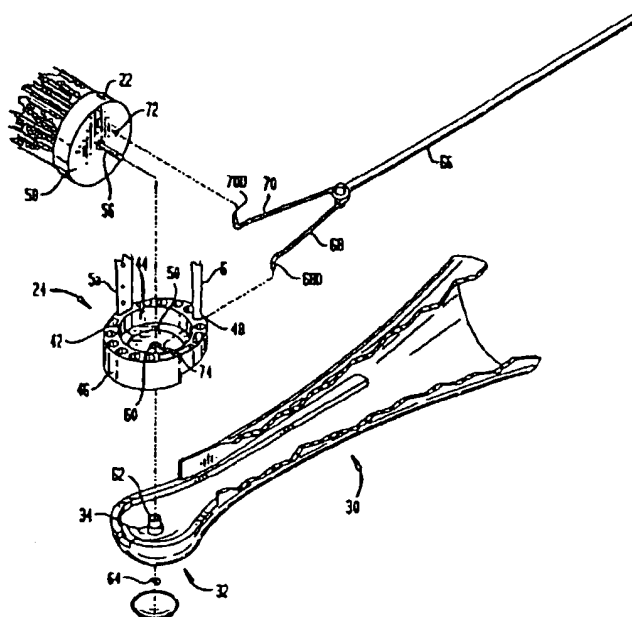
(43) International Publication Date  
28 December 2000 (28.12.2000)

PCT

(10) International Publication Number  
WO 00/78244 A1

- (51) International Patent Classification<sup>7</sup>: A61C 17/22, 17/34 (72) Inventors: COHEN, Howard, J.; Apartment 3N; 201 East 69th Street, New York, NY 10021 (US). BIRO, Ladislau; 14 Michael Drive, Metuchen, NJ 08840 (US).
- (21) International Application Number: PCT/US00/14970 (74) Agent: JAY, Mark, H.; P.O. Box E, Short Hills, NJ 07078-0383 (US).
- (22) International Filing Date: 31 May 2000 (31.05.2000) (81) Designated State (national): JP.
- (25) Filing Language: English (84) Designated States (regional): European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).
- (26) Publication Language: English
- (30) Priority Data: 09/338,750 23 June 1999 (23.06.1999) US Published: — With international search report.
- (71) Applicant: ADVANCED PROSTHETIC TECHNOLOGIES, INC. [US/US]; 14 Michael Drive, Metuchen, NJ 08840 (US). For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: BRUSH TIP FOR A MOTORIZED TOOTHBRUSH



(57) Abstract: A brush tip for a motorized toothbrush has a first brush head and a second brush head. The second brush head encircles the first brush head. Means are provided for differently accelerating the first and second brush heads in response to motion produced by the toothbrush motor.



WO 00/78244 A1

-1-

## BRUSH TIP FOR A MOTORIZED TOOTHBRUSH

Background of the Invention

5 The invention relates to toothbrushes, and more particularly relates to powered toothbrushes. In its most immediate sense, the invention relates to a brush tip for a powered toothbrush of the type in which the motor moves a plurality of brush heads.

10 In a conventional motorized toothbrush of the multi-head type, a disposable brush tip is detachably secured to the handle of the toothbrush. The tip has a plurality of brush heads, which oscillate (as by rotation) under the power of the motor. Each brush head has a plurality of tufts of bristles.

15 Existing motorized toothbrushes have relatively small "coverage", i.e. they do not clean large surface areas at one time. This is because the brush heads are relatively small. If they are made too large, they will put an excessive load on the motor.

20 Furthermore, some users operate such toothbrushes improperly. Instead of applying only light pressure, they force the bristles hard against the teeth. Under such conditions, the distal end of each tuft of bristles stays in the same place and the tufts twist themselves tightly in alternate directions. This makes the brushing less effective, because the bristles do not scrub the surfaces of the teeth.

25 It would be advantageous to provide a multi-head motorized toothbrush that would have greater coverage than conventional toothbrushes.

30 It would also be advantageous to provide a multi-head motorized toothbrush that would perform better even when the user applies excessive pressure against the tooth surfaces to be cleaned.

-2-

In accordance with the invention, a brush tip for a motorized toothbrush has a first brush head and a second brush head. The second brush head encircles the first brush head, and means are provided for differently  
5 accelerating the first and second brush heads in response to motion produced by the toothbrush motor.

Because the second brush head encircles the first brush head, the two head together have a relatively large area and, therefore, greater coverage. And, because the  
10 two brush heads are accelerated differently, their bristles do not twist themselves together even when pressed hard against the teeth.

In preferred embodiments, the first and second brush heads are accelerated in opposite directions, the first  
15 brush head is circular, and the second brush head is elliptical. The elliptical brush head provides greater coverage than a circular brush head and the opposite motions of the heads make it impossible for the bristles attached to the first brush head to twist into the  
20 bristles attached to the second brush head.

For toothbrushes of the type wherein the motor produces oscillating rotational motion of a shaft, a gear is mounted at the end of the shaft and is used to rotate the brush heads. For toothbrushes of the type wherein  
25 the motor produces reciprocating linear motion of an actuator, two connecting rods are used to convert this linear motion into oscillating rotational motion of the brush heads.

Although the second brush head is advantageously  
30 continuous, it need not be so. It may be made up of a plurality of segments thereby having one or more gaps.

#### Brief Description of the Drawings

The invention will be better understood with reference to the following illustrative and non-limiting  
35 drawings, in which:

-3-

Fig. 1 illustrates a conventional motorized toothbrush with a brush tip of the single head type;

Fig. 2 illustrates how the bristles of the Fig. 1 toothbrush twist together when pressed against a tooth with excessive force;

Fig. 3 illustrates a preferred embodiment of the invention;

Figs. 4A and 4B are, respectively, a view of a part and an exploded view of a first preferred structure for the Fig. 3 embodiment, this being suitable for use with a motorized toothbrush of the linear motor type;

Figs. 5a, 5b, and 5c schematically illustrate the operation of the structure shown in Fig. 4; and

Fig. 6 illustrates the operation of a second preferred structure for the Fig. 3 embodiment, this being suitable for use with a motorized toothbrush of the oscillating motor type.

#### Detailed Description of Preferred Embodiments

In the following description, the same element is always indicated by the same reference numeral in all the Figures, and corresponding elements are indicated by primed reference numerals. The drawings are not necessarily to scale.

Turning first to Fig. 1, a conventional motorized brush tip generally indicated by reference numeral 2 has a brush head 4 on which tufts 6 of bristles 8 are secured. The brush head 4 is oscillated back and forth by a motor (not shown) while the user (not shown) brushes his or her teeth (not shown).

To use the toothbrush properly, the distal ends of the bristles 8 should not press hard against the surfaces of the teeth. Under such conditions, the bristles 8 scrub the tooth surfaces and remove food particles etc. therefrom. However, as can be seen in Fig. 2, some users apply an excessive pressure to the toothbrush, causing

-8-

operation. In the preferred embodiment, this arc is 120°, but this is not part of the invention.

Fig. 6 shows an alternate structure, for use in instances wherein the motor (not shown) causes a shaft 80 to undergo rotational oscillation. In this structure, the first and second brush heads 22' and 24' have the same general shapes, but there are no connecting rods. Instead, toothed regions 50G and 58G are cut into the bottom surfaces 50' and 58', the shaft 80 extends through the slot 52', and a conical gear 82 at the distal end of the shaft 80 engages the toothed regions 50G and 58G.

It will be understood that the above description may not apply precisely to a production-engineered device. For example, although the surfaces 50, 58 are described as flat, they need not be precisely planar and may even be curved as long as the device as assembled works without excessive play or vibration. Likewise, although the connecting rods 68, 70 are advantageously straight, they may alternatively be slightly bent if this does not interfere with proper operation.

Although at least one preferred embodiment of the invention has been described above, this description is not limiting and is only exemplary. The scope of the invention is defined only by the claims, which follow:

-9-

1        1.    A brush tip for a motorized toothbrush, comprising:  
2            a first brush head;  
3            a second brush head, the second brush head  
4    encircling the first brush head; and  
5            means for differently accelerating said first and  
6    second brush heads in response to motion produced by the  
7    toothbrush motor.

1        2.    The brush tip of claim 1, wherein said differently  
2    accelerating means causes the brush heads to rotate in  
3    opposite senses about a common axis of rotation.

1        3.    The brush tip of claim 2, wherein the motorized  
2    toothbrush produces oscillating rotational motion of a  
3    shaft and said differently accelerating means transmits  
4    said motion to the first and second brush heads.

1        4.    The brush tip of claim 3, wherein:  
2            the second brush head has a central well with a  
3    toothed region on the bottom surface and a peripheral  
4    wall with a slot therein, the slot extending generally  
5    parallel to said bottom surface;  
6            the first brush head is generally cylindrical with a  
7    toothed region on the bottom surface;  
8            the first brush head is located in said well; and  
9            the shaft has a conical gear at its distal end and  
10    extends into the slot in such a manner that the gear  
11    engages with the toothed regions on the first and second  
12    brush heads.

1        5.    The brush tip of claim 2, wherein the motorized  
2    toothbrush produces reciprocating linear motion of an  
3    actuator and said differently accelerating means converts  
4    said linear motion into oscillating rotational motion of  
5    the brush heads.

-10-

1        6.    The brush tip of claim 5, wherein:  
2            the second brush head has a central cylindrical well  
3            with a flat bottom surface and a peripheral wall with a  
4            slot extending parallel to said bottom surface;  
5            the first brush head is cylindrical and has a flat  
6            bottom surface;  
7            the first brush head is located in said well;  
8            and further comprising first and second connecting rods,  
9            each passing through the slot and connecting the actuator  
10           with a corresponding one of the brush heads.

1        7.    The brush tip of claim 6, wherein each of the  
2            connecting rods has a hook that engages a corresponding  
3            recess in the bottom surface of a corresponding one of  
4            the brush heads.

1        8.    The brush tip of claim 7, wherein both connecting  
2            rods are formed of a single piece of wire.

1        9.    The brush tip of claim 1, wherein the first brush  
2            head is circular and wherein the second brush head is  
3            elliptical.

-11-

1 10. The brush tip of claim 1, wherein the second brush  
2 head is continuous.

1 11. A brush tip for a motorized toothbrush, comprising:  
2 a first circular brush head;  
3 a second elliptical brush head, the second brush  
4 head encircling the first brush head; and  
5 means for rotating said first and second brush heads  
6 in opposite senses about a common axis of rotation in  
7 response to motion produced by the toothbrush motor.



1/4

FIG. 1  
(PRIOR ART)

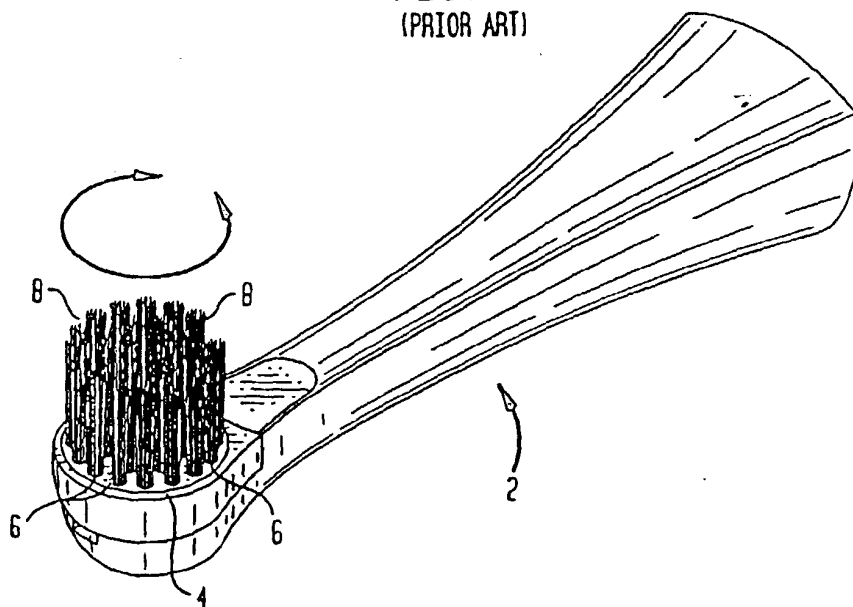
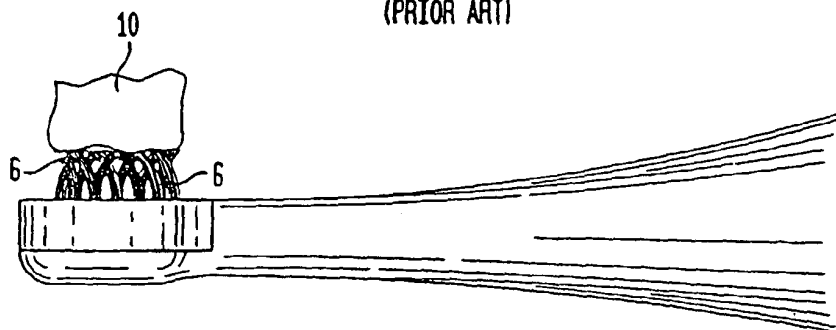


FIG. 2  
(PRIOR ART)



2/4

FIG. 3

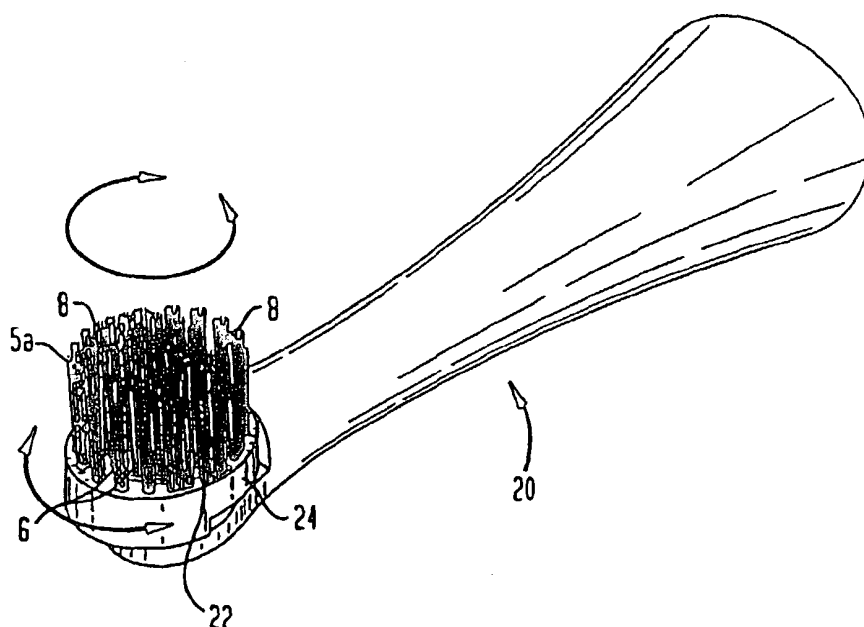


FIG. 4A

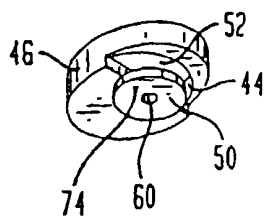
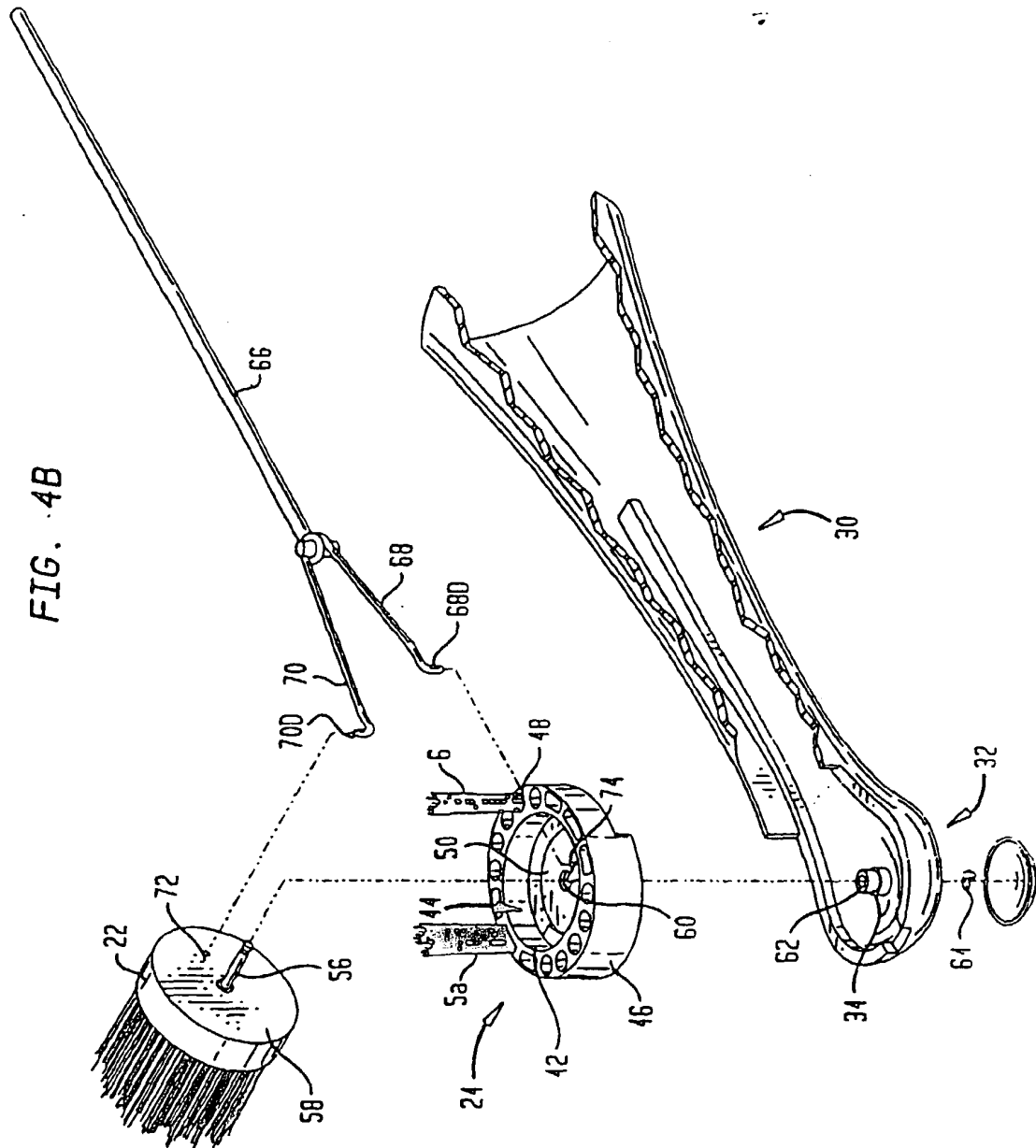
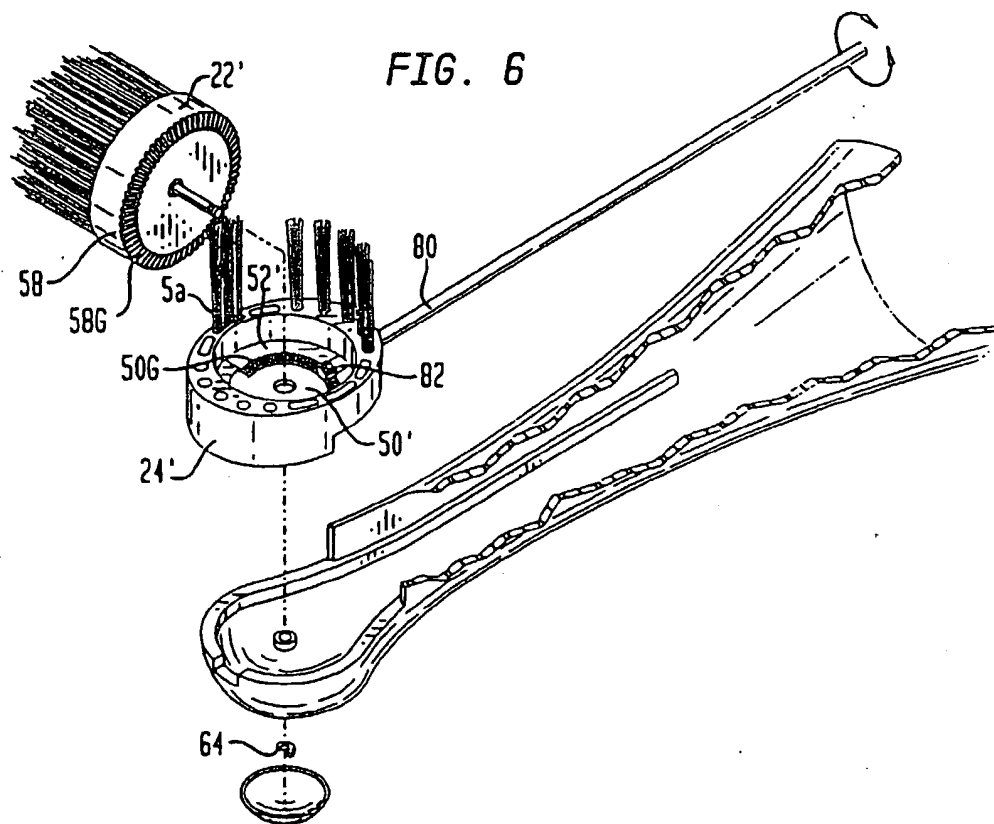
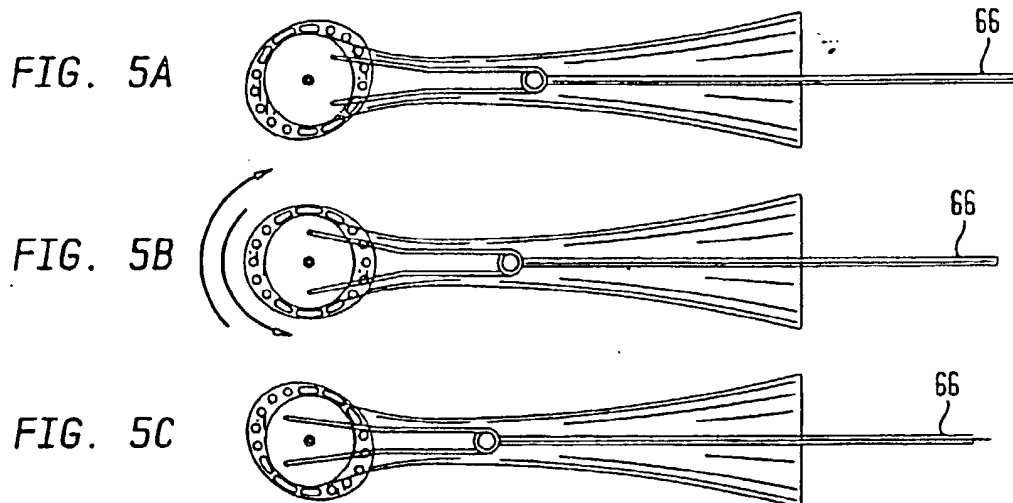


FIG. 4B





# INTERNATIONAL SEARCH REPORT

Int. Patent Application No.

PCT/US 00/14970

## A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 A61C17/22 A61C17/34

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 A61C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 744 139 A (CLIFFFIELD IND LTD) 27 November 1996 (1996-11-27) column 8, line 38-59 column 9, line 6-10 figure 4	1-4
A		9
X	DE 295 17 610 U (WIK ELEKTRO HAUSGERAETE) 13 March 1997 (1997-03-13) page 3, line 1-23 figures	1-3, 5, 6
X	DE 42 39 251 A (BRAUN AG) 26 May 1994 (1994-05-26) column 8, line 38-43 column 9, line 13-16 figure 6	1-3
	-/-	

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

### \* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

4 September 2000

Date of mailing of the international search report

11/09/2000

Name and mailing address of the ISA

European Patent Office, P.B. 5618 Patentlaan 2  
NL - 2280 HV Rijswijk  
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl.  
Fax: (+31-70) 340-3016

Authorized officer

Chabus, H

# INTERNATIONAL SEARCH REPORT

Int'l Application No

PCT/US 00/14970

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
P,X	DE 198 03 311 A (FINALPINA AG) 5 August 1999 (1999-08-05) column 2, line 54-68 figures	1-3,5-7

# INTERNATIONAL SEARCH REPORT

Indo. International Application No

PCT/US 00/14970

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 0744139 A	27-11-1996	CN 1150896 A JP 9168496 A US 6032313 A	04-06-1997 30-06-1997 07-03-2000
DE 29517610 U	13-03-1997	NONE	
DE 4239251 A	26-05-1994	AT 155665 T CN 1089821 A,B DE 59306976 D DK 624079 T WO 9412121 A EP 0624079 A ES 2105343 T GR 3024978 T HK 1001490 A JP 2710692 B JP 7505814 T US 5577285 A	15-08-1997 27-07-1994 28-08-1997 02-03-1998 09-06-1994 17-11-1994 16-10-1997 30-01-1998 19-06-1998 10-02-1998 29-06-1995 26-11-1996
DE 19803311 A	05-08-1999	NONE	